

3 a semiconductor substrate having a surface, a portion of said surface having
4 silicon thereon and a portion of said surface having an insulator thereon,
5 said surface further having an oxide thereover;
6 a chamber;
7 at least one workpiece holder within said chamber adapted to hold said
8 substrate;
9 at least one pump adapted to evacuate said chamber to maintain a continuous
10 vacuum in said chamber;
11 at least one line operatively connected between said at least one pump and
12 said chamber for evacuating said chamber;
13 at least one input line adapted to provide a chemical agent into said chamber
14 while in said continuous vacuum, said chemical agent adapted to remove
15 said oxide from said surface of said substrate;
16 at least one output line adapted to remove said cleaning agent and said
17 removed oxide from said chamber;
18 a reactor in said chamber, said reactor adapted to deposit a metal onto said
19 silicon and insulator portions on said substrate surface while in said
20 continuous vacuum;
21 a heating element, said heating element adapted to heat said substrate to an
22 elevated temperature to form a silicide on said substrate surface over the
23 silicon portion by reaction with the metal deposited thereon, while the
24 metal remains unreacted over the insulator portion; and

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an etchant to remove unreacted metal from the substrate surface while leaving

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said silicide over portions of said semiconductor substrate.

Please add new claims 21-30.

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1 21. A system for selectively forming a silicide on a surface of a semiconductor
2 substrate comprising:

3 said semiconductor substrate having said surface, a portion of said surface
4 having silicon thereon and a portion of said surface having an insulator
5 thereon, said surface further having an oxide thereover;

6 a chamber;

7 at least one pump adapted to evacuate said chamber to maintain a continuous
8 vacuum in said chamber;

9 a chemical agent input into said chamber adapted to remove said oxide from
10 said surface of said substrate while said chamber is under said continuous
11 vacuum;

12 a reactor in said chamber, said reactor adapted to deposit a metal onto said
13 silicon and insulator portions on said substrate surface while under said
14 continuous vacuum;

15 a heating element, said heating element adapted to heat said substrate to an
16 elevated temperature to form a silicide on said substrate surface over the

17 silicon portion by reaction with the metal deposited thereon, while the
18 metal remains unreacted over the insulator portion; and
19 an etchant to remove unreacted metal from the substrate surface while leaving
20 said silicide over portions of said semiconductor substrate.

1 22. The system of claim 21 wherein said chamber comprises a plurality of
2 interior chambers, at least one interior chamber adapted to remove said oxide from
3 said surface of said substrate while under said continuous vacuum, and at least one
4 interior chamber adapted to deposit said metal on said surface of said substrate
5 while under said continuous vacuum.

23 23. The system of claim 22 wherein said apparatus is adapted to transfer said
2 substrate between said interior chamber adapted to remove said oxide from said
3 surface of said substrate and said interior chamber adapted to deposit said metal
4 on said surface of said substrate without breaking said continuous vacuum.

1 24. The system of claim 21 wherein said metal is cobalt.

1 25. The system of claim 21 wherein said chemical agent is selected from the
2 group consisting of nitrogen trifluoride and argon.

1 26. The system of claim 21 wherein said reactor for depositing said metal on
2 said surface of said substrate is a vapor sputtering device.

1 27. The system of claim 21 wherein said heating element resides within said
2 chamber.

1 28. The system of claim 21 wherein said heating element is external thereto
2 said chamber.

1 29. The system of claim 21 wherein said unreacted cobalt is removed using an
2 etchant comprising hydrogen peroxide and sulfuric acid.

1 30. An apparatus in combination with a semiconductor substrate for selectively
2 forming a silicide thereon a surface of said semiconductor substrate comprising:
3 a portion of said semiconductor substrate surface having silicon thereon and a
4 portion of said surface having an insulator thereon, said surface further
5 having an oxide thereover;
6 a chamber;
7 at least one workpiece holder within said chamber adapted to hold said
8 semiconductor substrate;
9 at least one pump adapted to evacuate said chamber to maintain a continuous
10 vacuum in said chamber;

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11 at least one line operatively connected between said at least one pump and
12 said chamber for evacuating said chamber;
13 at least one input line adapted to provide a chemical agent into said chamber
14 while in said continuous vacuum, said chemical agent adapted to remove
15 said oxide from said surface of said substrate;
16 at least one output line adapted to remove said cleaning agent and said
17 removed oxide from said chamber;
18 ^{Sub} a reactor in said chamber, said reactor adapted to deposit a metal onto said
19 ^{Si} silicon and insulator portions on said substrate surface while in said
20 ^{Cl} continuous vacuum;
21 ^{at} a heating element, said heating element adapted to heat said substrate to an
22 elevated temperature to form a silicide on said substrate surface over the
23 silicon portion by reaction with the metal deposited thereon, while the
24 metal remains unreacted over the insulator portion; and
25 an etchant to remove unreacted metal from the substrate surface while leaving
26 said silicide over portions of said semiconductor substrate.
